

# **PLUGGING THE LEAKS**

Adapted from the Tennessee Valley Authority

**Overview:** In this lesson, students make their own draft-o-meter and use a home draft checklist to survey their homes for drafts.

**Objectives:** The student will...

1. Describe infiltration and identify locations where it is likely to occur.
2. Name several ways to stop infiltration.
3. Survey his/her home for drafts.
4. Explain how infiltration influences energy use.

**Time:** 90 – 135 minutes

**Subject:** Science

**Suggested Grade Level:** 2 – 5

**Vocabulary:**

- **Caulking:** material that seals small cracks, joints or seams to prevent air from leaking through.
- **Draft:** an air current in an enclosed space.
- **Infiltration:** the leaking of air through small openings into or out of a building.
- **Weatherstripping:** narrow pieces of insulating material used to cover or seal the cracks around windows and doors to prevent air from leaking through.

**Materials:** Pencil, tape, plastic food wrap, student sheets (included)

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## **BACKGROUND INFORMATION**

Winds or temperature differences can cause air to leak out of or into your house. This process is called infiltration. A certain amount of fresh air to replace the stale air caused by breathing, cooking, smoking, and other things are desirable and even necessary. Most houses, however, suffer from too much air infiltration. In a very “light” house the air is replaced with outside air every one hundred and twenty minutes (two hours). In a leaky house the air may be replaced about every twenty minutes.

In winter, the colder it is outside, the more rapidly infiltration takes place. Inside air which you have paid to heat can leak out, and cold air from outside can leak in. In summer, hot outside air can get inside and cool air you have paid to air condition can leak out.

“Little” air leaks might not seem important, but numerous “little” leaks can have the same effect as one or two open windows. A sixteenth-inch crack around a door frame has about the same effect as a three-and-a-half-inch hole in the wall. Finding the small air leaks and sealing them, either on the inside or the outside of the house, prevents unnecessary air infiltration and results in energy and cost savings.

## **PROCEDURE**

### **I. Setting the stage**

- A. Ask the students if they know what it means when someone says, “I feel a draft” or refers to a “drafty old house.” Let several students explain these sayings in their own words.
- B. Explain what a draft is. Give the students a definition for the term infiltration if appropriate. Have several students go to the classroom windows (and exterior door, if the classroom has one) and put their hands near the joints; do they feel drafts?
- C. Ask the students how drafts affect the comfort of people inside drafty buildings. In winter, what effect does draftiness have? What is its effect in summer?
- D. Share the background information, as appropriate, with the students.
- E. Explain how infiltration increases energy use.

### **II. Activity**

- A. Show the students a transparency made from the teacher sheet “CAULKING AND WEATHERSTRIPPING,” included. Cover the labels on the sheet.
  - 1. Ask them if they know what these pictures show.
  - 2. Discuss the pictures with them explaining what each picture shows.
- B. Give each student a copy of the student sheet “DRAFT-O-METER,” included.
  - 1. Have each student make a draft-o-meter by following the instructions on the student sheet.
  - 2. Have the students check for drafts in the classroom and other parts of the school building.
- C. Give each student a copy of the student sheet “HOME DRAFT CHECK LIST,” included. They are to use their draft-o-meters to check the locations listed on the sheet for drafts. As they survey their homes for drafts, they are to fill out the data chart on the student sheet.
- D. The next day, discuss the home draft checklists with the students. Have them suggest ways to stop infiltration in the locations in which it was detected.

## **FOLLOW-UP**

Have the students answer the following questions:

- A. What are some places where infiltration is likely? (For example, around windows and doors, cracks and holes around pipes, exhaust fans and light fixtures, and so on.)
- B. What can be done to prevent drafts? (Some possible answers include caulking around windows, weatherstripping around doors, filling cracks and holes with caulking or insulation, and so on.)
- C. Why are drafts an important energy consideration? (When drafts are not stopped, people tend to use more energy to keep their homes warm in winter and cool in summer. This is wasted energy.)

Stopping drafts saves energy, which saves money on energy bills, keeps us more comfortable, and helps conserve our energy resources.)

### **EXTENSIONS**

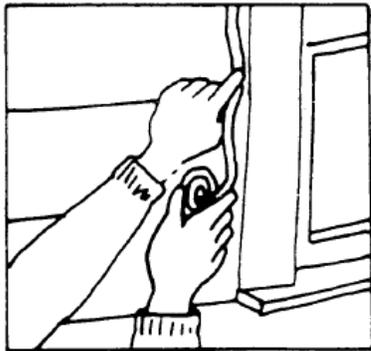
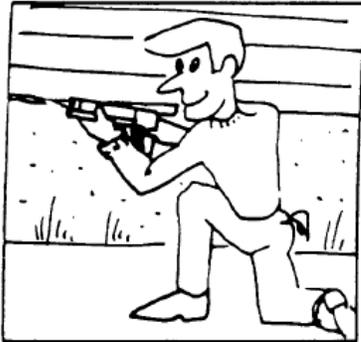
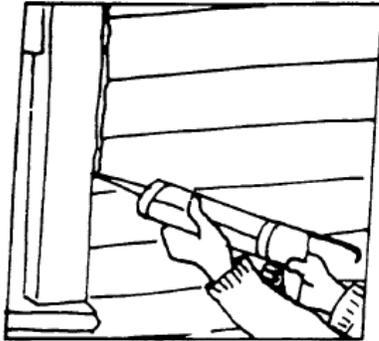
- A. Have the students conduct investigations in the school, local businesses, or in homes. Then recommend ways to decrease drafts and conserve energy.
- B. Invite a speaker from the local power company or a heating and cooling contracting business to discuss weatherizing houses and other buildings.

### **RESOURCES**

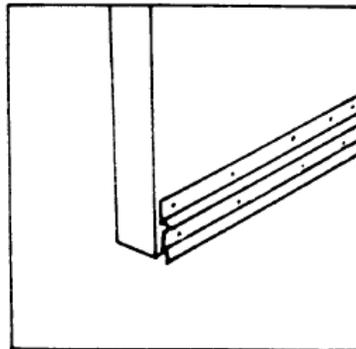
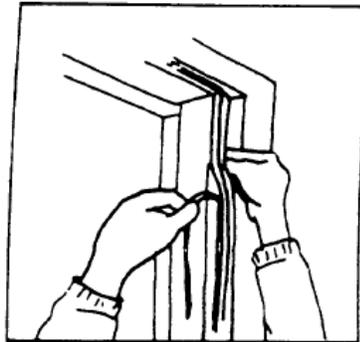
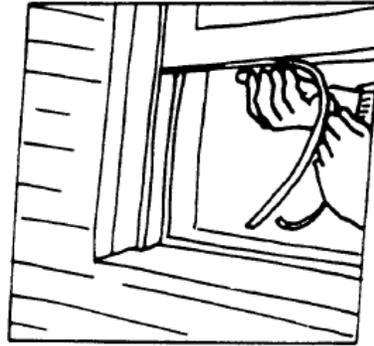
- U.S Department of Energy’s “Energy Savers” website at <http://www1.eere.energy.gov/consumer/tips/>
- Energy Star’s “Home Sealing” website at [http://www.energystar.gov/index.cfm?c=home\\_sealing.hm\\_improvement\\_sealing](http://www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_sealing)
- Weatherizing at <http://doityourself.com/energy/>

# CAULKING AND WEATHERSTRIPPING

CAULKING



WEATHERSTRIPPING

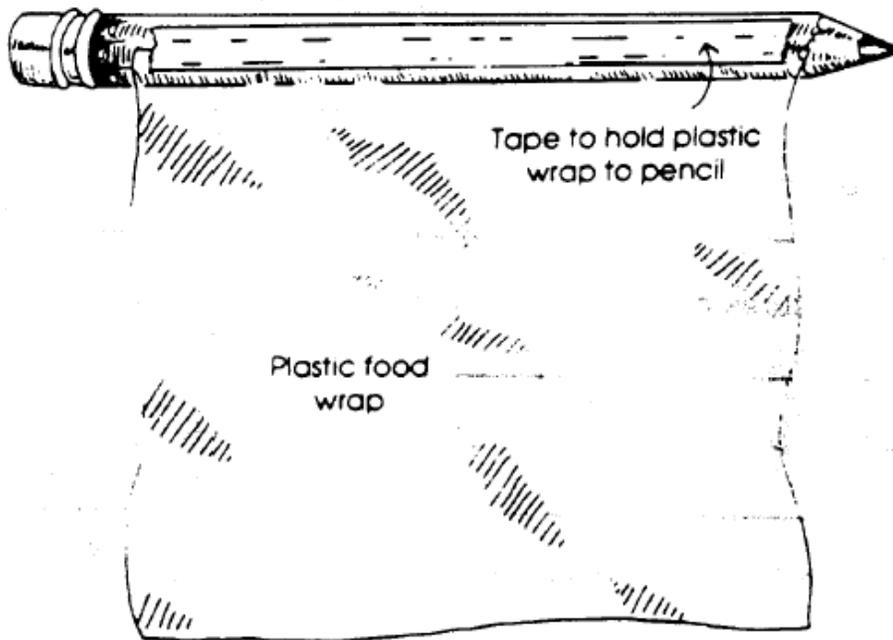


Handwritten squiggly lines, possibly representing a signature or a decorative element.

## DRAFT-O-METER

**Materials:** Pencil, tape, plastic food wrap

**Procedure:** Cut a 12cm by 25cm strip of plastic wrap. Tape the shorter edge of the wrap to a pencil and let the rest hang freely. Blow the plastic wrap gently and note how sensitive the wrap is to air movement. Drafts mean that air is leaking into or out of a building. This means either a loss of heat in winter or a loss of air conditioning in summer.



## HOME DRAFT CHECKLIST

Check each of the locations where drafts are likely. Where your draft-o-meter detects drafts, rate them by checking the right column. Rate drafts as: 1 (strong), 2 (moderate), or 3 (weak). If there is no draft, check the “no draft” column. If your home does not have a listed location, just draw a line through that location.

DRAFT LOCATIONS	NO DRAFT	DRAFT RATINGS		
		1	2	3
1. Exhaust fans in bathrooms and kitchens				
2. Dampers in fireplaces and woodstoves				
3. Doors				
4. Windows				
5. Light fixtures attached to walls and ceilings				
6. Attic door				
7. Window air-conditioning units left in place in winter				
8. Mail chutes or slots in walls or doors				
9. Cracks in the foundation of the house or holes where pipes pass through				
10. Where porches and steps meet the house				